Van de Graff Demo**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Station 4**

**Teacher Handout**

**Learning Goals (based on the Ministry of Education expectations):**

-to investigate the properties of static electricity and demonstrate an understanding of the principles

-analyze the design of a technological device that generates static electricity

**Introduction:**

A Van de Graff generator is a machine that deposits electrical charges on a rubber belt, as the rubber belt turns it re-deposits the electrical charges up in the metal ball. The accumulation of electrical charges produces a static electricity that exceeds 100,000 volts! It works a lot like scuffing your shoes on a carpet on a dry day.

**Safety Precautions:**

1. Remove all electrical devices.

2. Do NOT create human chains.

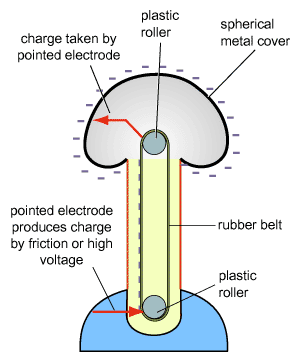
3. Students with heart problems should not come in contact with the generator.

Always supervise operation by students and warn them that they may get a small shock.

**Materials**

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| Van de Graff | Plastic Stool | Barbie Doll | Fluorescent Tube | Pie Plates  Optional | Pieces of paper  Optional |

**Diagram:**



**Static Electricity:**

Write the three laws for static electricity; remember static electricity consists of charges trapped in a substance moving rapidly.

**1.** Charged objects attract neutral objects.

**2.** Objects with the same charges repel each other.

**3.** Objects with different charges attract each other.

Albert Einstein**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_**

**Steps to be followed:**

**1.** In your group have a volunteer stand on top of the plastic footstool. (No volunteers? Then Barbie doesn’t mind a bad hair day)

**2.** **Before you turn the generator on,** place one hand palm down on the globe of the Van de Graaf.

**3.** **Now turn on** the Van de Graaf and wait for 1 to 2 minutes.

Turn off the Van de Graaf, wait for 1 minute and then remove the students hand from the machine.

**Note:** Please make sure you do not remove your hand from the globe, touch anyone or step down from the footstool while the machine is running. This will prevent students from being shocked.

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| --- |
| **1.** Describe what happens? The hair strands begin to rise and separate from one another.  **2.** Explain which Law has been demonstrated. Like charges repel each other. Because there is a buildup of charge on your body and on each individual hair, and since like-charges repel your each hair is trying to get as far away from the rest as possible  **3.** Why did we use a plastic stool? The student is insulated from the ground. If the charge cannot build up on the student, his/her hair will not stand up. |



Glowing Light **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Steps to be followed:**

1. **Turn on** the Van de Graaf generator.

2. Hold the fluorescent light tube and approach the charged Van de Graaf generator

**Note:** If possible, close the lights to see the best results.

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| --- |
| 1. Describe what happens? There are flashes of light in the fluorescent light bulb that does not go past your hand. When the light bulb is moved closer we can see sparks. A slight tingle can be felt.  2. Explain which Law has been demonstrated? Unlike charges attract. The charge from the Van de Graff is attracted to bulb. It flows through the bulb, through your hand, and down to the ground. This is actually electricity running through the light bulb.  3. Why did we not get electrocuted? (Hint: \_\_\_\_\_ Kills, not Voltage.)  Current kills, not voltage. |

**Note:** If there is extra time, demonstrate aluminum pie plates and pieces of paper stacked on top of the Van de Graff and ask the students the first two questions.